

## ABSTRACT

1       Methods and apparatus for simultaneous vaporization and ionization of a sample  
2       in a spectrometer prior to introducing the sample into the drift tube of the analyzer are  
3       disclosed. The apparatus includes a vaporization/ionization source having an electrically  
4       conductive conduit configured to receive sample particulate which is conveyed to a  
5       discharge end of the conduit. Positioned proximate to the discharge end of the conduit is  
6       an electrically conductive reference device. The conduit and the reference device act as  
7       electrodes and have an electrical potential maintained between them sufficient to cause a  
8       corona effect, which will cause at least partial simultaneous ionization and vaporization  
9       of the sample particulate. The electrical potential can be maintained to establish a  
10      continuous corona, or can be held slightly below the breakdown potential such that arrival  
11      of particulate at the point of proximity of the electrodes disrupts the potential, causing  
12      arcing and the corona effect. The electrical potential can also be varied to cause periodic  
13      arcing between the electrodes such that particulate passing through the arc is  
14      simultaneously vaporized and ionized. The invention further includes a spectrometer  
15      containing the source. The invention is particularly useful for ion mobility spectrometers  
16      and atmospheric pressure ionization mass spectrometers.